

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: Life History and Stock Composition of Steelhead Trout
 Applicant Name: Yuba County Water Agency
 Mailing Address: 1402 D Street Marysville, CA 95901
 Telephone: 530/741-6278
 Fax: 530/741-6541

Amount of funding requested: \$ \$239,584 for 3 years

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision: see page of the Proposal Solicitation Package for more information.

- | | |
|---|--|
| <input type="checkbox"/> Fish Passage Assessment | <input type="checkbox"/> Fish Passage Improvements |
| <input type="checkbox"/> Floodplain and Habitat Restoration | <input type="checkbox"/> Gravel Restoration |
| <input type="checkbox"/> Fish Harvest | <input checked="" type="checkbox"/> Species Life History Studies |
| <input type="checkbox"/> Watershed Planning/Implementation | <input type="checkbox"/> Education |
| <input type="checkbox"/> Fish Screen Evaluations - Alternatives and Biological Priorities | |

Indicate the geographic area of your proposal (check only one box):

- | | |
|---|---|
| <input type="checkbox"/> Sacramento River Mainstem | <input checked="" type="checkbox"/> Sacramento Tributary: <u>Yuba River</u> |
| <input type="checkbox"/> Delta | <input type="checkbox"/> East Side Delta Tributary: <u> </u> |
| <input type="checkbox"/> Suisun Marsh and Bay | <input type="checkbox"/> San Joaquin Tributary: <u> </u> |
| <input type="checkbox"/> San Joaquin River Mainstem | <input type="checkbox"/> Other: <u> </u> |
| <input type="checkbox"/> Landscape (entire Bay-Delta watershed) | <input type="checkbox"/> North Bay: <u> </u> |

Indicate the primary species which the proposal addresses (check no more than two boxes):

- | | |
|--|---|
| <input type="checkbox"/> San Joaquin and East-side Delta tributaries fall-run chinook salmon | <input type="checkbox"/> Spring-run chinook salmon |
| <input type="checkbox"/> Winter-run chinook salmon | <input type="checkbox"/> Fall-run chinook salmon |
| <input type="checkbox"/> Late-fall run chinook salmon | <input type="checkbox"/> Longfin smelt |
| <input type="checkbox"/> Delta smelt | <input checked="" type="checkbox"/> Steelhead trout |
| <input type="checkbox"/> Splittail | <input type="checkbox"/> Striped bass |
| <input type="checkbox"/> Green sturgeon | |
| <input type="checkbox"/> Migratory birds | |

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

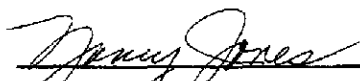
- | | |
|---|---|
| <input type="checkbox"/> State agency | <input type="checkbox"/> Federal agency |
| <input type="checkbox"/> Public/Non-profit joint venture | <input type="checkbox"/> Non-profit |
| <input checked="" type="checkbox"/> Local government/district | <input type="checkbox"/> Private party |
| <input type="checkbox"/> University | <input type="checkbox"/> Other: _____ |

Indicate the type of project (check only one box):

- | | |
|--|---|
| <input type="checkbox"/> Planning | <input type="checkbox"/> Implementation |
| <input type="checkbox"/> Monitoring | <input type="checkbox"/> Education |
| <input checked="" type="checkbox"/> Research | |

By signing below, the applicant declares the following:

- (1) the truthfulness of all representations in their proposal;
- (2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and
- (3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.



 (Signature of Applicant)

LIFE HISTORY AND STOCK COMPOSITION OF STEELHEAD TROUT IN THE LOWER YUBA RIVER

Submitted by:
Yuba County Water Agency

II. Executive Summary

b. Project Description and Primary Biological/Ecological Objectives. The purpose of this study is to address the basic need for information on the life history and stock composition (i.e., contributions of hatchery and wild fish) of steelhead trout to support ecosystem restoration and species recovery programs under the Ecosystem Restoration Program Plan (ERPP), the federal Endangered Species Act (ESA), the Anadromous Fisheries Restoration Program (AFRP), and California's Anadromous Fisheries Program Act of 1988. The primary objectives of the study are to 1) use scale characteristics to assess the population and life-history characteristics (e.g., age structure, length of freshwater residence) of Yuba River steelhead, 2) estimate the contributions of hatchery and wild steelhead to Yuba River runs, and 3) evaluate the utility of scale characteristics as a tool for distinguishing between hatchery and wild Central Valley steelhead.

c. Approach/Tasks/Schedule. Adult steelhead will be trapped in the north fish ladder at Daguerre Point Dam. Lengths and weights will be measured, any external tags or marks will be noted, and scale and tissue samples will be collected from individual fish. An effort will be made to trap adult steelhead throughout the year (subject to actual run timing and trapping conditions) and in sufficient numbers to accurately assess life history variation and stock composition of Yuba River steelhead. Scale analysis will be performed to determine the age, life-history pattern, and origin of individual steelhead. Reference scale collections will be obtained from known wild and hatchery sources. Scale characteristics identified by other researchers as important variables for discriminating hatchery and wild steelhead stocks, and other characteristics that may be identified during this study, will be evaluated to determine their reliability for discriminating between wild and hatchery steelhead among Yuba River samples. Genetic analyses will be used to complement and evaluate the utility of scale characteristics as a tool for distinguishing hatchery and wild steelhead.

The study would be conducted over a 3-year period. Work products would include a field and laboratory manual, quarterly progress reports, and a final report with appendices and data summaries. The appendices will include a report from J. L. Nielsen, U. S. Forest Service (USFS), regarding the results of the genetic analyses.

d. Justification for Project and Funding by CALFED. This study is directed specifically at steelhead trout, an ERPP priority species, and ERPP's stated need for additional research to address the large deficiencies in information regarding steelhead freshwater and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology. The information generated by this study, in conjunction with other proposed research and monitoring of steelhead in the lower Yuba River, will support the CALFED Bay-Delta Program's (CALFED's) ERPP restoration objectives of steelhead (CALFED Programmatic Environmental Impact Statement/Environmental Impact Report [EIS/EIR] Technical Appendix, Volume 1, Page 160) by identifying important life-history strategies and associated habitat needs of steelhead in the lower

Yuba River, facilitating future assessment and monitoring of natural steelhead production (i.e., distinguishing hatchery from wild fish), and implementing broader ecosystem restoration actions that are consistent with the life-history and ecological needs of steelhead. This information has also been identified as important to the success of other federal and state steelhead recovery and management programs, including the ESA, AFRP, and California's Anadromous Fisheries Program Act of 1988.

e. Budget Costs and Third-Party Impacts. The total requested budget from CALFED is \$239,584. Yuba County Water Agency (YCWA) will provide \$60,000 of the total study cost of \$299,584. There are no third-party impacts associated with the study.

f. Applicant Qualifications. Yuba County Water Agency (YCWA) has taken an active role in fisheries monitoring, protection, and enhancement on the lower Yuba River since 1990 through the implementation of flow and water temperature control measures, funding of fisheries monitoring programs and assessments, and participation in fisheries restoration planning efforts currently being undertaken by the Yuba River Fisheries Technical Working Group (YCWA, U.S. Fish and Wildlife Service [FWS], National Marine Fisheries Service [NMFS], California Department of Fish and Game [DFG], and several local interests). YCWA proposes to use Jones & Stokes Associates (JSA) to coordinate, direct, and implement the proposed project. The JSA fisheries and aquatic ecology team has extensive technical, analytical, and field experience related to Central Valley fisheries, with major strengths in anadromous fish ecology, life history, and biology in the Yuba River. JSA has been YCWA's primary fisheries consultant since 1990 and has conducted numerous fisheries field investigations, monitoring, and assessments of lower Yuba River fisheries resources. Dr. J. L. Nielsen, a fisheries research scientist with the USFS Pacific Southwest Research Station, has conducted numerous investigations into the genetic relationships of steelhead and rainbow trout in California.

g. Monitoring and Data Evaluation. The proposed sampling program is designed to obtain sufficient numbers of steelhead over the annual migration period to define the range of life history patterns of Yuba River steelhead; provide sufficient statistical power to distinguish between different stocks; and determine the relative abundance of steelhead of different ages, life history patterns, and origins. Single- and multivariate statistical procedures (e.g., analysis of variance/covariance, discriminant analysis) will be used to evaluate differences in measured scale parameters and other variables (e.g., length-weight relationships) between different stocks, and to select the variable or set of variables with the greatest discriminatory power.

h. Local Support/Coordination with Other Programs/Compatibility with CALFED Objectives. As the applicant, YCWA provides the necessary local agency involvement to maintain local support. Coordination with other agencies and monitoring programs will be necessary for successful implementation of this project. Scale reference collections will be needed from various ongoing and proposed research, monitoring, salvage, and hatchery programs. Planning and design of the fish trap and associated facilities will need to be coordinated with the U.S. Army Corps of Engineers' (ACOE's) and FWS's current planning efforts to improve fish passage at Daguerre Point Dam. The project will make substantial progress toward implementing CALFED's ERPP vision and will contribute to key provisions of the AFRP and DFG's Steelhead Restoration and Management Plan for California.

III. Title Page

**LIFE HISTORY AND STOCK COMPOSITION OF STEELHEAD TROUT
IN THE LOWER YUBA RIVER**

Applicant:

Yuba County Water Agency
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Website: www.ycwa.com
E-mail: ycwa@ycwa.com

Type of Organization: Public Agency
Tax Identification Number: Federal Tax ID#: 94-1623441
Participants/Collaborators: Jones & Stokes Associates
J. L. Nielsen, U.S. Forest Service
Proposal Solicitation Topic: Species Life-History Studies

July 2, 1998

IV. Project Description

a. Project Description and Approach. The purpose of this study is to address the basic need for information on the life history and stock composition (i.e., contributions of hatchery and wild fish) of steelhead trout to support ecosystem restoration and species recovery programs under the ERPP, ESA, AFRP, and California's Anadromous Fisheries Program Act of 1988. The primary objectives of the study are to 1) use scale characteristics to assess the population and life-history characteristics (e.g., age structure, length of freshwater residence) of Yuba River steelhead, 2) estimate the contributions of hatchery and wild steelhead to Yuba River runs, and 3) evaluate the utility of scale characteristics as a tool for distinguishing between hatchery and wild Central Valley steelhead. This will be accomplished by:

- trapping adult steelhead during their upstream migration in the lower Yuba River;
- measuring lengths and weights of adult fish, noting the presence of any external tags or marks, and collecting scales and tissue samples for scale and genetic analyses;
- using scale characteristics to determine the age and life history (e.g., length of freshwater and ocean residence) of individual fish;
- analyzing the scale patterns of known wild and hatchery stocks that may contribute to steelhead/rainbow trout populations in the Yuba River;
- identifying reliable qualitative and/or quantitative scale parameters for discriminating between different stocks;
- using genetic analysis to evaluate the reliability of stock discrimination based on scale analysis; and
- applying the results of scale and genetic analyses to determine the stock composition of lower Yuba River steelhead runs.

b. Proposed Scope of Work

The schedule, budget, and deliverables for the following tasks are shown in Table 1. Tasks 1-4 and 6 are considered inseparable if only a portion of the project is funded.

Task 1. Coordination. Coordination with other fish monitoring programs in the Yuba River and other Central Valley rivers will be necessary to provide support for this program and other related or dependent programs, facilitate data exchange among these programs, and establish common sampling methods and protocols for data collection and analysis. These programs may include:

- rotary screw trapping of downstream migrating juvenile salmon and steelhead in the lower Yuba River (proposed for implementation by DFG in 1999 and funded by the Comprehensive Assessment and Monitoring Program (CAMP) of the Central Valley Project Improvement Act (CVPIA),

- Feather River Hatchery, Nimbus Hatchery, Coleman National Fish Hatchery, Mokelumne River Hatchery, and hatcheries that supply rainbow trout for planting programs above Englebright Dam;
- graduate research of habitat use by adult and juvenile steelhead in the lower Yuba River (proposed for implementation by J. Kozlowski, University of California, Davis, in 1999, and funded by YCWA);
- chinook salmon carcass surveys and mark-recapture estimates of spawner abundance (conducted annually by JSA and funded by YCWA),
- angler surveys of the lower Yuba River and other major Central Valley rivers (conducted annually by DFG and funded by CAMP), and
- fish salvage operations at the Hallwood-Cordua fish screen on the lower Yuba River (existing program funded and operated by DFG), and
- ACOE's and FWS's current planning efforts to improve fish passage at Daguerre Point Dam,

Coordination activities would include meetings, correspondence, and telephone communications during the course of the proposed project.

Task 2. Fish-Trap Design and Construction. JSA will develop conceptual and final designs for a removable fish trap that will be compatible with the existing fish ladder on the north side of Daguerre Point Dam. JSA will invite representatives of ACOE, Pacific Gas and Electric Company (PG&E), DFG, FWS, NMFS, and other interested parties to attend up to two site visits and provide input on the draft conceptual and final design plans. Planning and design of the fish trap and associated facilities would be coordinated with ACOE's and FWS's current planning efforts to improve fish passage at Daguerre Point Dam.

Task 3. Fish Trapping and Data Collection. Adult steelhead will be trapped in the north fish ladder at Daguerre Point Dam during their upstream migration. The north ladder was selected for trapping because it is used by upstream migrating salmonids to a greater extent than the south ladder. Because of significant variability in run timing, trapping will be conducted year round as conditions permit. The goal will be to trap at least 30 adult steelhead per month to accurately characterize the run and provide sufficient statistical power for stock discrimination. Trapping will be conducted for up to 5 consecutive days every 2 weeks, but this schedule may be modified depending on the actual timing and abundance of upstream migrants during the trapping period. The trap will be inspected at least three times a day and more frequently if large numbers of fish are being captured. All steelhead in excess of sampling needs and other species will be counted and allowed to continue up the ladder.

Adult steelhead will be sedated in an anaesthetic bath (MS-222 solution) before measurements and samples are taken. Measurements will include fork length, standard length, and body weight. The presence of any external tags or marks will be noted. If the adipose fin is missing (indicating

a hatchery fish), a tag detector will be used to determine the presence of a coded-wire tag. If a coded-wire tag is present, the fish will be sacrificed and the snout removed and sent to DFG for tag extraction and decoding. Scale samples will be collected using published methods (Davis and Light 1985). Fin samples for deoxyribonucleic acid (DNA) analyses will be collected according to "dry method" protocols (J. L. Nielsen pers. comm.). General comments regarding the appearance of the fish (e.g., body color and form, eroded fins) will be recorded. Following data collection, all fish will be placed in a live well to recover before being released.

Task 4. Scale Preparation and Analysis. Scale analysis will be performed in the laboratory to determine age, life history, and origins of steelhead in the lower Yuba River. Scale impressions will be made on acetate film and magnified and viewed under a microfiche reader. All scale measurements will be made with a millimeter ruler or micrometer. NMFS, FWS, and DFG will be contacted to inquire about the availability of an image analysis system (e.g., Optimus) for measuring scale parameters. The cost of purchasing and/or leasing this type of system is not included in the proposed budget.

Two experienced scale readers will make independent determinations of age, freshwater and ocean residence periods, and spawning history of individual steelhead using standard methods and scale structures (e.g., winter annuli, circuli spacing, spawning checks) (Davis and Light 1985). Any disagreements will be resolved during a third joint reading.

Steelhead scales of known and unknown origin will be used to identify specific scale parameters that can be used in stock discrimination. Potential scale parameters include the length of the freshwater zone, the number of circuli in the freshwater zone, and the spacing of circuli in the freshwater and ocean growth zones (Bernard and Myers 1996, Davis and Light 1985). Hatchery practices and known life-history traits of wild steelhead will also be reviewed to identify differences that may result in scale characteristics unique to hatchery or wild fish.

Beginning in 1999, potential sources for reference scales from wild steelhead in the Yuba River will include rotary screw trapping of juvenile outmigrants, sampling of juveniles during a proposed habitat use study, and fish salvage operations at the Hallwood-Cordua fish screen. Coded-wire-tagged steelhead captured at Daguerre Point Dam will be an important source of confirming stock determinations based on scale analysis. Other potential hatchery sources include the Feather River Hatchery, Nimbus Hatchery, Coleman National Fish Hatchery, Mokelumne River Hatchery, and hatcheries that supply rainbow trout for planting programs above Englebright Dam. It is assumed that scale reference collections are currently available or will be available for this study. No funding is requested at this time for obtaining scale reference collections.

Task 5. Genetic Analyses. Tissue samples from lower Yuba River steelhead will be sent to Hopkins Marine Station or University of California, Berkeley, for analyses of mitochondrial and microsatellite DNA. Dr. J. L. Nielsen, USFS, is currently analyzing samples of hatchery and wild Central Valley steelhead under a separate contract with NMFS. This work is scheduled to be completed in October 1998. As part of the currently proposed study, samples from the lower Yuba River will be sent to Dr. Nielsen's lab for genetic analysis. The objective of this analysis will be to determine the stock composition of steelhead in the lower Yuba River and identify any unique genetic differences between Yuba River steelhead and other Central Valley stocks.

Task 6. Report Preparation. A draft manual describing the field sampling methods/protocols and laboratory techniques will be prepared and submitted to CALFED and cooperating agencies for review before implementation of field and laboratory work. Quarterly progress reports will be submitted according to the reporting requirements on page 14 of the Proposal Solicitation Package (PSP). A final report with data summaries and appendices will be submitted at the end of the project. The appendices will include a report from J. L. Nielsen regarding the results of the genetic analyses.

c. Location of Project

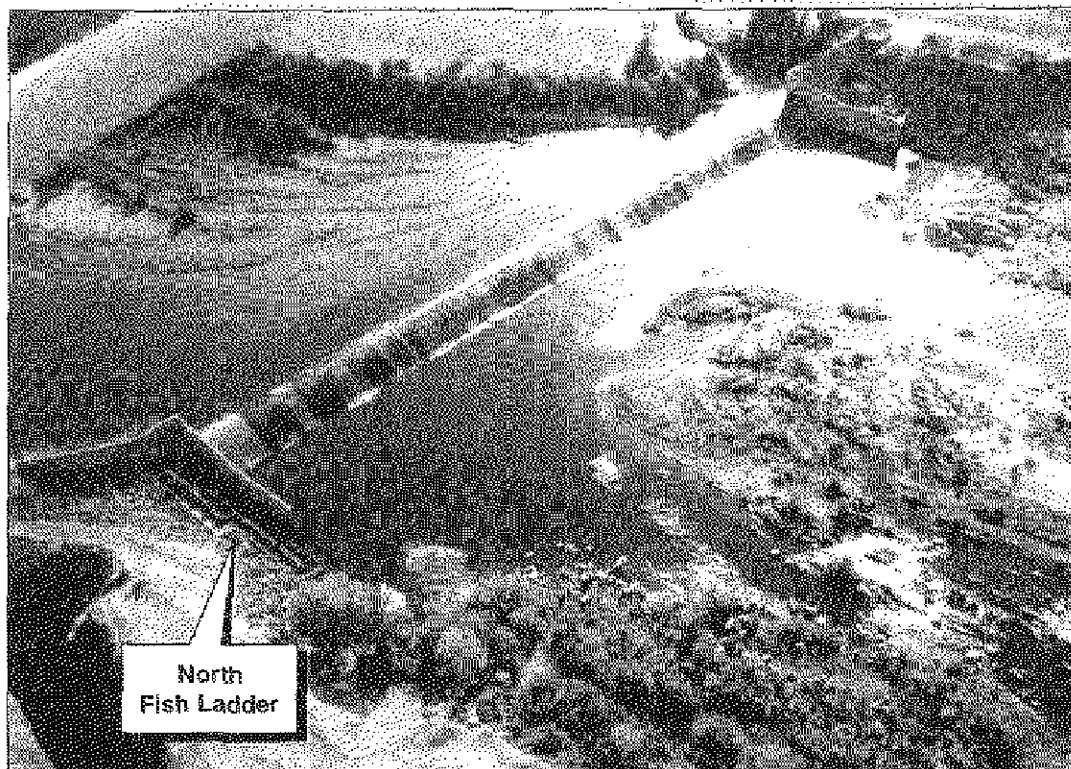
Fish trapping and data collection will be conducted at Daguerre Point Dam, located in the lower Yuba River approximately 12 miles upstream of its confluence with the Feather River in Yuba County (Figure 1). Fish will be trapped in the fish ladder on the north side of the dam (Figure 2).

d. Expected Benefits

The primary benefit of this study will be to provide basic information on the life history and stock composition of steelhead trout in the lower Yuba River for use in identifying and evaluating the effectiveness of proposed restoration and management actions directed at steelhead trout. The information generated in this study is expected to have broad application to Central Valley steelhead in general and will contribute to the success of ongoing and proposed ecosystem and fisheries restoration programs, including ERPP, AFRP, and DFG's Steelhead Restoration and Management Plan for California. Specific benefits of the proposed study will include significant improvement in our understanding of the basic life-history characteristics of steelhead so that appropriate restoration and management actions can be implemented, and the ability to distinguish between hatchery and wild stocks to evaluate the effectiveness of future restoration actions in increasing natural steelhead production. The results of this study will also be useful for evaluating the utility of scale analysis in identifying different hatchery stocks and their associated straying rates.

Potential secondary benefits include an opportunity to collect similar data on spring-run chinook salmon, which has also been identified as a priority species by the ERPP. In addition, an opportunity would exist to tag or mark steelhead for preliminary evaluations of mark-recapture techniques to estimate steelhead abundance in the lower Yuba River. Coordination with existing and proposed recovery programs (e.g., DFG angler surveys) would be necessary. If funding for the current proposal is approved, additional funds for tagging and recovery of adult steelhead can be sought from appropriate funding sources (e.g., CAMP). Funding is not requested for tagging or enumeration of adult steelhead and chinook salmon (spring- and fall-run) under this proposal, but will be an important consideration in the planning and design of fish passage modifications at Daguerre Point Dam currently being undertaken by ACOE and FWS.

Another secondary benefit of the program will be its contribution to addressing the data needs identified by the ERPP for assessing population management stressors, such as genetic interactions of hatchery and wild stocks.



Jones & Stokes Associates, Inc.

Figure 2

Daguerre Point Dam and Adjoining Fish Ladders

e. Background and Ecological/Biological/Technical Justification

The ERPP identifies steelhead trout as a priority species because they are important native anadromous sport and commercial fish that is listed as threatened under the federal ESA. The ERPP's vision for Central Valley steelhead is to ensure the recovery of this species to levels that contribute to overall species richness and diversity, reduce conflict between the need for their protection and other beneficial uses of water in the Bay-Delta, and support viable sport fisheries. These objectives are consistent with the steelhead recovery goals of the ESA, AFRP, and California's Anadromous Fisheries Program Act of 1988.

One of the ERPP's strategies for attaining these objectives is to support additional research to address the large deficiencies in information regarding steelhead freshwater and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology. The information generated by this study, in conjunction with other research and monitoring programs in the lower Yuba River, will support CALFED's ERPP restoration objectives for steelhead (CALFED Programmatic EIS/EIR Technical Appendix, Volume 1, Page 160) by identifying important life-history strategies and associated habitat needs of steelhead in the lower Yuba River, facilitating future assessment and monitoring of natural steelhead production (i.e., distinguishing hatchery from wild fish), and implementing broader ecosystem restoration actions that are consistent with the life-history and ecological needs of steelhead. This information has also been identified as important to the success of other federal and state steelhead recovery and management programs, including the ESA, AFRP, and California's Anadromous Fisheries Program Act of 1988.

This study addresses the need for basic information on the life history, biology, and stock composition of Central Valley steelhead trout. Despite overall declines in steelhead abundance, relatively little research and monitoring has been focused on Central Valley steelhead and there is little up-to-date information on the majority of stocks. Current information on steelhead in the Yuba River is based largely on angler surveys, incidental observations during field surveys and fish-salvage operations, and anecdotal accounts by guides and anglers. The proposed study, in conjunction with other research and monitoring programs in the Yuba River, will make substantial progress toward answering a number of important questions fundamental to the success of future steelhead restoration actions and monitoring programs, such as "what juvenile life-history strategies (e.g., number of years in freshwater) occur in the Yuba River and what factors limit the success of these different life-history types?", and "what proportion of returning adults are of natural origin, or, conversely, what is the extent of hatchery straying?".

The lower Yuba River provides a unique opportunity to address these questions. It is essentially the only wild steelhead fishery remaining in the Central Valley. The potential occurrence of native genotypes still exists in the lower Yuba River, and, although the fishery is believed to be sustained by natural production, the significance of straying is unknown. The fish ladders at Daguerre Point Dam provide an ideal location for trapping adult steelhead on their way to upstream spawning areas. Other capture methods (e.g., angler surveys, electrofishing) do not provide access to sufficient numbers of steelhead for assessing life history and stock composition of the run.

The use of scale and tissue samples for determining the life history and origins of steelhead is preferred over alternative methods that require sacrificing fish (e.g., otoliths). This is important

considering the current status of Central Valley steelhead trout. Researchers have used scales to successfully determine the age, life history, and origins of steelhead in mixed-stock fisheries (Bernard and Myers 1996, Davis and Light 1985). Genetic analysis requires only a small portion of a fin or even the epithelial skin attached to the base of a scale. Although it is currently state policy to mark all hatchery steelhead with an adipose clip, only a fraction are currently tagged with a coded-wire tag. The proposed methods offer a nonlethal alternative to stock identification and do not require the expense of tagging large numbers of steelhead with coded-wire tags.

f. Monitoring and Data Evaluation. The proposed sampling program is designed to obtain sufficient numbers of steelhead over the annual migration period to define the range of life-history patterns expressed by Yuba River steelhead; provide sufficient statistical power to distinguish between different stocks based on scale and genetic analyses; and determine the relative abundance of steelhead of different ages, life-history patterns, and origins. Single- and multivariate statistical procedures (e.g., analysis of variance/covariance, discriminant analysis) will be used to evaluate differences in measured scale parameters and other variables (e.g., length-weight relationships) between different stocks, and to select the variable or set of variables with the greatest discriminatory power. Data plotting, description, transformation, and analyses will be performed using commercially-available scientific software (e.g., SAS, Statistix).

g. Implementability

Coordination requirements for data collection were discussed under Task 1. In addition, YCWA will coordinate and obtain any necessary agreements with ACOE to operate the fish trap at Daguerre Point Dam. Planning and design of the fish trap and associated facilities will be coordinated with ACOE's and FWS's current planning efforts to improve fish passage at Daguerre Point Dam. Scale reference collections from existing and proposed fish research, monitoring, salvage, and hatchery programs will be needed as a basis for stock identification. YCWA will seek local support and awareness of the project through their existing public relations program.

Applications for state and federal research permits will be needed to authorize the capture of federally and state listed or candidate species. JSA is currently preparing applications to obtain the appropriate state and federal permits for the proposed project.

Trap operation may not be possible during periods of high flow and turbidity that commonly occur during winter. Because only limited flow regulation is possible in the fish ladder, the trap will be designed to accommodate changes in water surface elevation to extend the trapping period.

V. Costs and Schedule to Implement Proposed Project

a. Budget Costs

The total requested budget from CALFED is \$239,584. Although this amount is requested from CALFED, a companion proposal is being submitted to AFRP for matching federal funds. YCWA will provide \$60,000 of the total study cost of \$299,584. The cost of each task by funding source (CALFED and YCWA) is shown in Table 2.

b. Schedule Milestones

The proposed project will be implemented over a 3-year period. The implementation schedule for the proposed project is shown in Table 1. Quarterly progress reports will summarize progress on each task during the preceding quarter, any problems encountered and proposed solutions, and expected work in the succeeding month. The final report will be submitted to CALFED at the end of the project period.

Brief financial reports will be submitted on a monthly basis with monthly invoices for services rendered. Financial information required by CALFED to back up monthly invoices will be included in each report.

c. Third-Party Impacts

No third-party impacts are anticipated.

Table 1. Schedule, Budget, and Deliverables by Task

	Schedule	Budget	Deliverables
Task 1	Months 1-30	\$3,227	Quarterly progress reports
Task 2	Months 1-6	\$15,928	Quarterly progress reports, conceptual and final designs and plans
Task 3	Months 7-33	\$212,710	Quarterly progress reports
Task 4	Months 1-33	\$45,688	Quarterly progress reports
Task 5	Months 19-36	\$6,899	Report from J.L. Nielsen, USFS
Task 6	Months 34-36	\$15,133	Final report with data summaries and appendix

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Table 2. Cost Estimate for Assessment of Life History and Stock Composition of Steelhead in the Lower Yuba River

Task Description	Direct Labor Hours	Direct Salary Totals	Overhead, G & A Expense, Fee	Other Direct Costs	Total Cost	YCWA Contribution	Total Cost with Contribution
1. Coordination	32	\$1,009.51	\$2,217.05		\$3,226.56		
2. Fish trap design and construction	84	\$2,722.44	\$5,978.91	\$7,227.00	\$15,928.35		
3. Fish trapping and data collection	4,264	\$57,301.45	\$125,843.16	\$29,565.00	\$212,709.61		
4. Scale preparation and analysis	745	\$14,123.33	\$31,017.09	\$647.50	\$45,687.92		
5. Genetic analyses				\$6,898.50	\$6,898.50		
6. Report preparation	182	\$4,657.74	\$10,229.13	\$246.38	\$15,133.24		
Totals	5,307	\$79,814.47	\$175,285.35	\$44,484.38	\$299,584.19		
YCWA Contribution						(\$60,000.00)	
Total Cost with Contribution							\$239,584.19

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VI. Applicant Qualifications

YCWA has taken an active role since 1990 in fisheries monitoring, protection, and enhancement on the lower Yuba River through the implementation of flow and water-temperature control measures, funding of fisheries monitoring programs and assessments, and participation in fisheries enhancement planning efforts currently being undertaken by the Yuba River Fisheries Technical Working Group. YCWA has retained JSA to provide fisheries consulting services related to the above activities. YCWA will extend its existing contract with JSA to conduct the proposed project activities. YCWA will also coordinate and obtain any necessary agreements with ACOE to operate a fish trap in the north fish ladder at Daguerre Point Dam.

JSA's fisheries and aquatic ecology group is proposed to staff the JSA team for this project. This team has considerable experience and knowledge of Central Valley fisheries resources, and has conducted or prepared numerous fisheries investigations, monitoring programs, environmental assessments, and restoration/mitigation plans related to water resource, land use, flood protection, construction, and recreational activities throughout the basin. The team is thoroughly familiar with the life history, ecology, and environmental requirements of the fish species in the Sacramento-San Joaquin River system, including all federal and state special-status species. The team has extensive experience in fish capture, handling, and scale collection and analytical techniques.

JSA's team is uniquely qualified to conduct and direct fisheries research activities in the lower Yuba River. JSA has been YCWA's primary fisheries consultant since 1990 and has conducted numerous fisheries investigations, monitoring, and assessments of lower Yuba River fisheries resources. Past and ongoing Yuba River fisheries work include annual monitoring of abundance, migration timing, growth, and habitat requirements of juvenile chinook salmon and steelhead; annual chinook salmon carcass surveys using mark-recapture techniques to estimate spawner abundance; snorkeling and scuba surveys of adult steelhead and fall- and spring-run chinook salmon; fisheries impact assessments related to water transfers and other proposed operational changes; analyses of juvenile chinook salmon outmigration timing in relation to water temperature and flow; monitoring and assessment of redd dewatering and fish stranding; and investigations of the American shad run size and timing in relation to flows and water temperatures. The justification for not using a competitive bidding process is quite evident given that JSA has nearly 10 years of specific experience on the Yuba River, is most qualified to conduct this work, and is the best value for the CALFED program.

Phillip Dunn will serve as contract manager and will be responsible for quality assurance and control throughout the project. He is a certified fisheries scientist specializing in the management of complex water resources, fisheries, and instream-flow projects to comply with environmental laws, solve water rights conflicts, or identify appropriate instream-flow conditions. He has worked on both small- and large-scale water resources projects on major river systems throughout California. Mr. Dunn has successfully completed fish population, instream-flow, and aquatic monitoring studies; environmental assessments, impact reports, and impact statements; species and habitat management and mitigation plans; hydropower license applications; temporary water-transfer documents; and expert witness testimony. He has conducted several research programs on anadromous fishes; evaluated systemwide impacts and restoration opportunities associated with CVPIA; assessed cumulative impacts from water development in the upper Trinity River watershed; and designed and conducted extensive fish sampling studies on the San Joaquin

and Sacramento Rivers. Mr. Dunn currently serves as JSA's principal-in-charge or project manager for the U.S. Bureau of Reclamation's Central Valley Project Improvement Act Programmatic EIS, ACOE's Sacramento and American River flood control studies, FWS's Comprehensive Fisheries Assessment and Monitoring Program, Westland Water District groundwater pumping EIRs, YCWA fisheries investigations and water transfers on the Yuba River, Sonoma County Water Agency fisheries analyses on the Russian River, and others.

Mr. Dunn received an M.S. in fisheries biology from Humboldt State University, Arcata, California in 1981, and a B.S. in zoology from the University of California, Davis, California in 1979.

William Mitchell will manage and coordinate the proposed project activities within JSA and between the cooperating agencies and will supervise data analysis, interpretation, and report preparation activities. He has 13 years of professional experience as a fisheries biologist in California with a strong background in the life history, ecology, and population dynamics of anadromous fish in the Central Valley and in California coastal rivers and streams. Mr. Mitchell has a diverse background in aquatic sciences, with special expertise in fish population and habitat assessment and monitoring, fish population dynamics and modeling, fisheries impact assessment, sampling design and survey methods, and direct observation techniques. He served as regional coordinator for a statewide program to review, analyze, and synthesize information on steelhead trout in California and coauthored a comprehensive report submitted to NMFS to assist it in its ruling on the status of steelhead under the ESA. As part of his graduate program, Mr. Mitchell designed and implemented field research on the life history, habitat requirements, and competitive interactions of juvenile steelhead and cutthroat trout in the Smith River, California. He has served as principal fisheries scientist for lower Yuba River fisheries investigations and monitoring activities since 1990, and has extensive, first-hand knowledge of the ecology, life history, and status of anadromous and resident fish species in the lower Yuba River.

Mr. Mitchell received an M.S. in fisheries from Humboldt State University, Arcata, California in 1988, and a B.S. in biology from San Diego State University, San Diego, California in 1980.

Warren Shaul will assist in trap design, developing fish-handling protocols, and scale reading and evaluation. He is a Senior Environmental Scientist with JSA where he has worked for more than 10 years. Mr. Shaul has more than 20 years of experience in fish population modeling, sampling designs and statistical analysis, stock assessment methods, and fishery management. Mr. Shaul's experience and participation in the project will ensure implementation of effective trapping methods, acquisition of relevant data, and appropriate scale analysis and evaluation procedures. His work at JSA has involved capture and handling of juvenile and adult salmonids in the Sacramento River system, including netting and marking juvenile salmonids in the Yuba, Feather, and Sacramento Rivers and adjacent floodplains, and electrofishing for adult and juvenile salmonids in the upper Sacramento River. Before joining JSA, Mr. Shaul conducted research on fish traps (*Proceedings of the Gulf Caribbean Fisheries Institute* 1989) and has extensive experience with methods for capture of adult and juvenile fish. During his 6 years with the Washington Department of Fisheries, Mr. Shaul developed methods for aging clams as determined by internal growth lines in the shell (*Canadian Journal of Fisheries and Aquatic Sciences* 1982). The method was developed from and is analogous to methods for aging fish through growth lines on scales and otoliths.

Mr. Shaul received an M.S. in fisheries from Oregon State University, Corvallis, in 1984; and a B.S. in biology from Humboldt State University, Arcata, California in 1972.

Jeff Kozlowski will coordinate and supervise field personnel and data collection activities and assist in data analysis and report preparation. He is a staff fisheries biologist with more than 12 years of professional experience. He has special expertise in fisheries impact assessment, stream habitat inventory procedures, stream restoration techniques, fish sampling techniques, and the management and enhancement of reservoir fishery habitat. Mr. Kozlowski has extensive fisheries experience on the lower Yuba River, including chinook salmon carcass surveys using mark-recapture techniques to determine adult spawning population, field surveys using seining and snorkeling techniques to monitor the size, condition, distribution, and abundance of rearing juvenile chinook salmon, as well as direct observation techniques to evaluate the potential for salmon fry stranding resulting from proposed flow reductions. Mr. Kozlowski serves as field crew leader for ongoing Yuba River fisheries monitoring programs and has extensive experience sampling fish populations, including steelhead populations, using gill nets, hoop nets, boat and backpack electrofishing techniques, seines, and snorkeling techniques. He operated a fish weir on the McCloud River for The Nature Conservancy to tag migrating adult brown and rainbow trout, measure and weigh anaesthetized fish, and collect scale samples. Before joining JSA, Mr. Kozlowski designed, coordinated, and implemented reservoir fishery habitat improvement projects for the County of Monterey and conducted channel analysis, habitat typing, and snorkel surveys in central Sierra Nevada streams for USFS.

Mr. Kozlowski is an Associate Certified Fisheries Scientist with the American Fisheries Society. He received a B.S. in natural resources management with an emphasis in fisheries management from California Polytechnic State University, San Luis Obispo, in 1986, and is currently an M.S. degree candidate at University of California, Davis.

Elizabeth Campbell will serve as field crew leader for the trapping and data collection procedures and will assist in scale reading and evaluation. She is a staff fishery biologist with more than 10 years of experience in fisheries research. She has studied the habitat use and behavior of both juvenile and adult Central Valley spring-run chinook salmon in Butte Creek (Butte County) and Deer and Mill Creeks (Tehama County). She also has participated in the population monitoring of spring-run chinook salmon in these streams and published an article (with Peter Moyle) on their decline in California. Her technical experience includes the capture and handling of live fish and collection and interpretation of fish scales. She conducted an age-and-growth study (based on scale analysis) of Arctic charr for the Alaska Cooperative Fishery Research Unit.

Ms. Campbell received a B.S. in fisheries management from Ohio State University in 1985 and an M.S. in zoology from the University of Wisconsin in 1989. She expects to receive her Ph.D. in Ecology from the University of California, Davis, in September 1998.

Dr. Jennifer Nielsen, a fisheries research scientist with the USFS Pacific Southwest Research Station, has conducted numerous investigations into the genetic relationships of steelhead and rainbow trout in California. Dr. Nielsen received a Ph.D. in environmental science, policy, and management from the University of California, Berkeley, in 1994, an M.S. in wildlands resource sciences from the University of California, Berkeley, in 1990, and a B.S. from Evergreen State College, Olympia, Washington in 1987.

VII. Compliance with Standard Terms and Conditions

This project has been developed in compliance with all of CALFED's standard terms and conditions presented in Appendix D of CALFED's Request for Proposals. YCWA has reviewed and will comply with CALFED's standard terms and conditions. We can also work with any reasonable contract terms that may depend on the source of funds (CVPIA, Proposition 204, stakeholder contributions, etc.). We understand that the contract terms will apply to any subcontracts we may enter into to complete this work. We have no conflicts of interest in performing this work.

We will comply with all "standard clauses/proposal requirements" that fall under "Services/Consulting/Preconstructing Research". As a "public" applicant, YCWA must submit, as part of this proposal, evidence of nondiscrimination compliance and noncollusion. This evidence is attached to this submittal. All applicable standard clauses and proposal requirements will be submitted to comply with before or at the signing of the final contract.

In addition, YCWA and its proposed subcontractor, JSA, have no real or perceived conflict of interest and the project is designed to comply with all applicable laws and regulations, does not prejudice the ultimate decision on the CALFED long-term program, involves only willing sellers and landowners, is consistent with ERPP objectives, and will be commenced only when a funding agreement is signed.

NONDISCRIMINATION COMPLIANCE STATEMENT

ITEM 7

COMPANY NAME

Yuba County Water Agency

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME

Nancy Jones

DATE EXECUTED

June 29, 1998

EXECUTED IN THE COUNTY OF

Yuba

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

Assistant Administrator

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Agreement No. _____

Exhibit _____

**NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY
 BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS**

STATE OF CALIFORNIA)
)ss
 COUNTY OF YUBA)

Nancy Jones

(name)

, being first duly sworn, deposes and

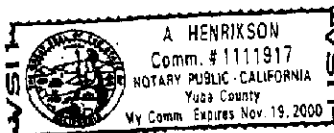
says that he or she is Assistant Administrator of
 (position title)

Yuba County Water Agency
 (the bidder)

the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

DATED: June 29, 1998

By Nancy Jones
 (person signing for bidder)



(Notarial Seal)

Subscribed and sworn to before me on

6-29-98
 (Notary Public)

A. Henrikson